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EXAMINER

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This is a communication from the examiner in charge of your application.  
COMMISSIONER OF PATENTS AND TRADEMARKS

4/9/96 + 5/9/96

This application has been examined  Responsive to communication filed on 4/9/96  This action is made final.

A shortened statutory period for response to this action is set to expire Th (sic) 3 month(s), 7 days from the date of this letter.  
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

1.  Notice of References Cited by Examiner, PTO-892.
2.  Notice of Draftsman's Patent Drawing Review, PTO-948.
3.  Notice of Art Cited by Applicant, PTO-1449.
4.  Notice of Informal Patent Application, PTO-152.
5.  Information on How to Effect Drawing Changes, PTO-1474.
6.

Part II SUMMARY OF ACTION

1.  Claims 45-84, 96, 160-231 are pending in the application.

Of the above, claims \_\_\_\_\_ are withdrawn from consideration.

2.  Claims \_\_\_\_\_ have been cancelled.

3.  Claims \_\_\_\_\_ are allowed.

4.  Claims 45-84, 96, 160-231 are rejected.

5.  Claims \_\_\_\_\_ are objected to.

6.  Claims \_\_\_\_\_ are subject to restriction or election requirement.

7.  This application has been filed with informal drawings under 37 C.F.R. 1.85 which are acceptable for examination purposes.

8.  Formal drawings are required in response to this Office action.

9.  The corrected or substitute drawings have been received on \_\_\_\_\_. Under 37 C.F.R. 1.84 these drawings are  acceptable;  not acceptable (see explanation or Notice of Draftsman's Patent Drawing Review, PTO-948).

10.  The proposed additional or substitute sheet(s) of drawings, filed on \_\_\_\_\_, has (have) been  approved by the examiner;  disapproved by the examiner (see explanation).

11.  The proposed drawing correction, filed \_\_\_\_\_, has been  approved;  disapproved (see explanation).

12.  Acknowledgement is made of the claim for priority under 35 U.S.C. 119. The certified copy has  been received  not been received  been filed in parent application, serial no. \_\_\_\_\_; filed on \_\_\_\_\_.

13.  Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.

14.  Other

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EXAMINER'S ACTION

The following is a quotation of the first paragraph of 35

U.S.C. § 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification is objected to under 35 U.S.C. § 112, first paragraph, as the specification, as originally filed, does not adequately describe or support the invention as is now claimed; and as failing to adequately teach how to make and/or use the invention, i.e; failing to provide a disclosure which enables the person skilled in the art to make and use an invention commensurate in scope with the claims.

As a first issue under 35 USC 112, first paragraph, please note that the following claims vaporize any "carbon source": claims 45-67; 71-84; 96; 160-171; 175-196; 200-209; 213; 215-216; 218; and 220-227. The term "carbon source", on its face can be any carbon source, even those already gaseous ones like dimethyl ether or methane, for example.

However, the specification and claims as originally filed, do not provide an enabling disclosure for producing C60 and C70 molecules from vaporizing anything other than elemental carbon. Please note page 3, lines 26-31 of the original specification, which recites "vaporizing carbon from any source containing carbon in its various forms, e.g., graphite, amorphous and glassy

carbon". The "carbon vapor" so formed gets quenched and nucleated. This vapor appears to be essentially nothing but carbon atoms. If the "source" of carbon were not elemental carbon then the question would arise and persist as to what brings about the conversion of, say dimethyl ether into a carbon vapor composed essentially of carbon. Since the specification does not enable any kind of conversion of a non-elemental carbon source (that is, a combined carbon <sup>form</sup> <sub>from</sub>) into "carbon vapor", then the specification is only enabled for the carbon source being the elemental carbon described therein.

As a second issue under 35 USC 112, paragraph 1 note that the following claims prepare a "carbon allotrope" or "caged molecules" or "fullerenes": 160, 180; and 182-203. Claims 160 and those which depend from it recite "preparing a carbon allotrope comprising caged molecules consisting solely of carbon atoms which are soluble". However, the specification as originally filed has no written description of "cage molecules"; it merely characterizes that C60 and C70 can be deemed species of "caged molecules". The specification as originally filed has no written description of a genus of "carbon allotrope". only of a "brownish-red allotrope of carbon" or that C60/C70 is an allotrope of carbon. However, two species do not ordinarily support a genus. "Caged molecules" (to the extent the phrase is understood) and "carbon allotrope ... capable of being dissolved in non-polar solvents" appears to encompass carbon

nanotubes (open and closed), and species such as C76, C80, C82, etc., for which there is no written description in the original disclosure.

Similarly, new claims 182 and 187 recite a "process for preparing a fullerene". However, there is no written description for the generic term "fullerene", only for the three molecules C60, C70 and C240. Three species do not ordinarily support a genus. It has not been established that the only generic language of the original specification (a "brownish-red carbon allotrope" of original claim 27) is coextensive with "fullerene", since a "brownish-red carbon allotrope" can be defect-structure diamond or a graphite thin film.

Since the disclosure does not reasonably convey to one of ordinary skill in the pertinent art that the applicants had possession of the generic invention as is now claimed, at the time the application was filed, the claims introduce new concepts and thus contain new matter.

Furthermore, the disclosure does not enable the person skilled in the art to which the instantly claimed invention pertains, to make and use an invention commensurate in scope with the claims, since the specification is not enabled for the preparation of "caged molecules" or "carbon allotrope" or "fullerene" in the amounts specified in claims 160, 182, and 187. The claim embraces the production of tonnage quantities of open or closed carbon nanotubes or C76 or C80, etc, Yet, page 8, lines

1-5 recites, in characterizing Applicants' product, that "the only other large mass found in any abundance corresponds to C70".

Thus even if arguendo the instant disclosure teaches one to make and use trace quantities of open or closed carbon nanotubes or C70 or C80, etc., it clearly does not enable one to make those species in "any abundance", not to mention" in macroscopic amounts".

The specification is also not a commensurately enabling one, because the scope of the claims is broadened from the original disclosure, in that they now embraced formation an isolation of very large quantities of C60 (e.g., one ton), while the original disclosure's literal language only supports the production of C60/70 quantities sufficient to produce coatings that are 2 microns thick. There is no disclosure supporting or describing larger quantities of C60 as are now embraced by the claims.

Claims 45-67, 71-84, 96, 160-209, 213, 215-216, 218 and 220-227 are rejected under 35 U.S.C. § 112, first paragraph, for the reasons set forth in the objection to the specification.

Claims 83-84, 160-181, 222-229 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 160 and 181 it is unclear as to how much constitutes "amounts... capable of extracting and recovering... therefrom said allotrope in solid form". For example, if,

arguendo, a microgram of C60 was an amount needed to qualify as solid C60, would a process which produced a kilogram of soot which in toto contained microgram C60 (i.e., a parts-per-billion concentration) be within the claims (since 1 microgram C60 is "capable" of being extracted and "capable" of yielding 1 microgram solid C60? Does the claimed process depend upon what scale it is run, i.e., how much "sooty carbon product" is made or collected, or whether the process is batch or continuous? The lower limit as to the scope of the claimed "amounts" is indefinite because it is unclear how much of anything is the accepted value to be considered a "solid". Note that a solid particle of colloidal gold can be  $1.7 \times 10^{-7}$  cm in size. Is this the order of magnitude which Applicants intend?

In claim 83, lines 4-7, and in claim 84, lines 5-7, it is unclear how a practitioner of the process can know with certainty whether said practitioner has in possession "amounts sufficient to be capable of providing a ... colored solution", as detection of "colored" depends upon visual acuity, which varies from person to person.

In claim 83, lines 4-7, and in claim 84, lines 5-7, it is unclear as to what is the scope of "amounts (or quantities) [of C60] sufficient to be capable of producing a... colored solution when extracted with sufficient [or effective] amounts of benzene". Would a metric ton of "sooty carbon product" containing a gram of C60 (i.e., a ppm C60 concentration) and extracted with

a liter of solvent, be within the scope of the claims, (since quantities on the order of one gram C60 can impart color to solvent quantities on the order of one liter)? Note that the breadth of "extracted" does not preclude portionwise Soxhlet extraction of large quantities of "sooty carbon product" (e.g., metric ton) with small quantities of solvent (e.g., liter). What then is the lower limit of the scope of the claims as to amount of C60?

In claim 160, it is unclear what is a "caged molecule". Does it refer to molecules encaged within something else? Does it refer to any molecule which could arguably resemble a cage in appearance?

Claims 45-84, 96, 160-231 of this application conflict with claims 45-68 of application serial number 08/486,669. 37 C.F.R. § 1.78(b) provides that when two or more applications filed by the same applicant contain conflicting claims, elimination of such claims from all but one application may be required in the absence of good and sufficient reason for their retention during pendency in more than one application. Applicant is required to either cancel the conflicting claims from all but one application or maintain a clear line of demarcation between the applications. See M.P.E.P. § 822.

The non-statutory double patenting rejection, whether of the obvious-type or non-obvious-type, is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent. In re Thorington, 418 F.2d 528, 163 USPQ 644 (CCPA 1969); In re

Vogel, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); In re Van Ornam, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); In re Longi, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); and In re Goodman, 29 USPQ2d 2010 (Fed. Cir. 1993).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321 (b) and (c) may be used to overcome an actual or provisional rejection based on a non-statutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.78 (d).

Effective January 1, 1994, a registered attorney or agent of record may sign a Terminal Disclaimer. A Terminal Disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 45-84, 96, 160-231 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 45-68 of copending application Serial No. 08/486,669. Although the conflicting claims are not identical, they are not patentably distinct from each other because the respective claims only differ in the functional recitation of how much C60 fullerene is made in the carbon vaporization process. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have carried out the process of the instant claims in view of the claims of the copending '669 application, because said copending application is directed towards the same production and recovery of the same C60 fullerene as are the instant claims.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --  
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 182-191 and 194-202 are rejected under 35 U.S.C.

§ 102(b) as being anticipated by Bacon (US Patent 2,957,756.

Bacon strikes an arc from a graphite rod to a graphite block, all under an argon atmosphere of 1360 pounds per square inch, using 80 volts direct current, 60 amperes per square inch. What is isolated were carbon filaments of crystal perfection approaching that of single crystals. See col. 2, lines 18-60. The conditions performed in Bacon were the same as those which the instant specification states are effective to form C60 fullerene ("the pressure can be raised to any level just below the point where the reactor would explode"; page 4, line 31- page 5, line 1). therefore Bacon must have inherently made C60 fullerene to the same extent as in the rejected claims. Whatever C60 was made was solid after cooling. Bacon also most distinctly meets the limitations of claims 182 and 187 because "caged molecules consisting solely of carbon atoms", and "fullerenes" as written, are terms which are sufficiently broad to embrace the "large graphite sheets rolled up into a tight tube" explicitly formed by Bacon (col. 3, lines 15-20).

The following is a quotation of 35 U.S.C. § 103 which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Subject matter developed by another person, which qualifies as prior art only under subsection (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. § 103, the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 C.F.R. § 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of potential 35 U.S.C. § 102(f) or (g) prior art under 35 U.S.C. § 103.

Claims 45-54, 58, 62-63, 65, 76-80, 83-84, 96, 160-163, 168-169, 179-196, 200-209, 213, 215-216, 218, and 220-227 are rejected under 35 U.S.C. § 103 as being unpatentable over Yoshimura (US Patent 4,808,395), in view of Reck (US 4,435,378); with Shigematsu (Idemitsu Tokohu article) cited only to show states of fact.

Yoshimura is relied upon to teach the steps of vaporizing a carbon source such as a hydrogen, in the "presence of" an inert quenching gas (namely, the nitrogen component of air) under

conditions effective to form sooty "furnace black", i.e., carbon black. See col. 1 lines 9-15 and col. 5. lines 1-44. The furnace black is made at a rate exceeding 55 kg per hour. See table 1.

Yoshimura differs from the instant claims in not reciting a step of "recovering C60 in macroscopic amounts from said sooty carbon product", such as by recovering said C60 "in solution" of benzene or toluene (see instant claims 47-49 and 52-54).

Reck teaches that one can purify furnace carbon black to remove extractable components including polycyclic aromatic hydrocarbons, by Soxhlet extract of the carbon black with solvents such as boiling toluene. See col. 1, lines 23-69.

The Shigematsu reference is relied upon to show that inherently the furnace carbon black contains 1.6 ppm C60 in a form which is capable of being extracted and recovered therefrom in solution of toluene by Soxhlet extraction with toluene. Shigematsu teaches that a ten-hour Soxhlet extraction of 3 kg conventional carbon black synthesized in large quantities from petroleum which is partially combusted and then cooled with sprays of water, can yield 5 milligrams of a substance which is essentially C60. See pages 3-4 of translation.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have continuously extracted 3 kg or greater of furnace carbon black made by the process shown in Yoshimura, by toluene, in order to remove extractables and thereby "purify" the furnace black for sale,

because Reck teaches that these extractables can be removed by such extraction and because Yoshimura teaches making at least 55 kg of the furnace black per hour. In an industrial scale furnace black manufacturing-purification process, enough C60 would be made to more than satisfy the claim limitation that the C60 present therein is present "in amounts capable of extracting and recovering predominantly therefrom... C60 in macroscopic amounts and in solid form", since Shigematsu shows that inherently, enough is in carbon black to meet the limitation. Note that the claims require no concentration for C60 in the initially formed soot and therefore do not distinguish over the references. The extraction step suggested by Reck would constitute a recovery of macroscopic amounts of C60, since upon a complete extraction of 55 kg of furnace carbon black, (for the purpose of "purifying" it) , 92 milligrams (clearly a macroscopic amount) of C60 would be recovered.

To get the C60 in solid form as required by instant claim 46, note that it would have been obvious to distill off the extraction solvent used in the above described combination of references in order to reuse the solvent, thereby leaving a solid comprising C60 behind.

Note that the bag filter for collecting carbon black shown in Yoshimura, col. 6, line 1, can fairly be deemed a substrate for collecting a sooty carbon product. Note that the extraction suggested by the Reck reference would meet the purification step

broadly claimed in claim 79-80 because the claims recite solvent extraction as constituting a purifying step.

Claims 45-54, 58, 62-63, 65-78, 83-84, 96, 160-163, 167-169, 171-183, 187-88, 192-202 are rejected under 35 U.S.C. § 103 as being unpatentable over Kratschmer (article entitled "The Infrared ..Spectra of ... Carbon Dust", published in Chem. Phys. Lett., 06 July 1990), in view of Hamilton (US Patent 3,094,428) and Kargin (article entitled "Condensation of Carbon Black Particles ... By Condensation of Carbon Vapor", from Colloid J. of USSR).

The Kratschmer article substantially identically recites the C60-fullerene production steps of the instant application. More particularly, this reference teaches producing carbon smoke particles by resistive heating of graphite rods in an inert He quenching gas having a pressure of 100 torr. The smoke was collected on substrates. Infrared and ultraviolet spectroscopy of the collected substance was consistent with a C60 molecule of the soccerball structure. See entire document.

This article qualifies as prior art by virtue of section 102(a) of 35 USC, since it is technically a reference to "another", due to the presence of the Fostiropoulos co-author. Please see MPEP 2132.01, especially discussion therein to Ex Parte Kroger, 219 USPQ 370 (BPAI 1982).

This article does not appear to have "extracted" C60 from the smoke particles.

Hamilton '428 teaches that it is known to disperse carbon black in benzene in order to form ink compositions or rubber compositions. See col. 1, lines 50-65.

Kargin teaches that carbon particles made from the condensation of carbon vapor in an argon atmosphere, can be deemed to be carbon black. A graphite anode and cathode were opposed to each other and a plasma was formed therebetween by passing current to the electrodes. A solid product was collected on a quartz tube. See page 258, 18-22 and page 256, lines 10-36.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have dispersed the carbon smoke particles of the Kratschmer reference in benzene, thereby to have accomplished an extraction of C60 therefrom, because Hamilton teaches that it is known to disperse carbon black in benzene in order to form ink compositions or rubber compositions, and because Kargin would teach to the person of ordinary skill in the art to recognize Kratschmer's particles as being carbon black.

Applicant's arguments filed 09 April 1996 have been fully considered but they are not deemed to be persuasive.

Applicants argue that it is improper to reject as unclear the recitation that C60 is recovered "as a solid", because "the presence or absence of sufficient material to be visible as a solid is a characteristic that is easily determinable".

However, the claims do not state that the C60 which is formed must be "visible" as a solid, only that it must exist as a solid. The question persists as to "how much", that is, what is the scope of a material which exists as a solid? Would a metric tonne of carbon black having a milligram of C60 in it qualify as a substance having sufficient amount of C60 to form a "solid"?

Applicants argue that reciting that a C60 product "is formed in amounts sufficient to be capable of forming a colored solution when dissolved in benzene", is a clear way of defining how much C60 is in a substance.

However, the claims do not point out just what the test entails. Does one carry out the test by immersing the entire product formed as a result of the initial nucleation of the carbon vapor, into benzene at one time? Or alternatively, can a metric tonne of carbon black having a milligram of C60 in it qualify as a substance having sufficient amount of C60 to be capable of forming a colored solution when dissolved in (one milliliter of) benzene? In short, while applicants argue that the claims recite "simple tests to easily ascertain whether the requisite amount of product is produced" (page 13, lines 22-23 of the Response filed 09 April 1996), it is submitted that neither of the "tests" of the claims clearly point out what is the scope of the amounts of C60 made and recovered, for the reasons stated above.

Applicants argue that "caged molecules" refers to an allotrope containing only carbon atoms, and that "caged molecule" is "synonymous with fullerenes".

However, it is still unclear what are the metes and bounds of a caged molecule, even one consisting solely of carbon atoms. When viewed from a particular perspective, models of the diamond lattice can be perceived to look like a cage. The graphite lattice is often referred to as having a "chicken wire fence" appearance. Do these then qualify as cage or caged molecules?

With respect to the rejections under the first paragraph of section 112, Applicants begin by stating that the concept of "fullerene" has ample support and "permeates the instant specification", because each of the C60 and C70 and C240 molecules discussed in the specification is an example of a fullerene.

However, the generic terminology of "fullerene" is absent from the specification; therefore there is no written description for it. Also the specification does not appear to inherently show that Applicants had possession of all the members of the genus which is now claimed. Contained within the rubric "fullerene" are *inter alia* carbon onions and giant fullerenes which were only discovered by surprise in 1991 or thereafter, i.e., after the filing date of the instant application. Without the generic language the claims cannot embrace these species within their purview. The specification does appear to show that the C60

molecule which was made is in fact a soccer ball shaped molecule (e.g. it has the transmission infrared spectroscopy values expected for such a shape; see page 12 of the instant specification). However, the specification does not go any further than the 3 molecules mentioned *supra* as having such a shape. Also, it has not been established that the only generic language of the original specification (a "brownish-red carbon allotrope" of original claim 27) is coextensive with "fullerene", since a "brownish-red carbon allotrope" can be a defect-structure diamond or a graphite thin film.

Applicants point to Paragraph 15 of the Declaration submitted by the esteem Professor Kroto as attesting that the application describes fullerenes to the skilled artisan. The quote from the Declaration is that the "application adequately teaches to the skilled artisan how to make macroscopic amounts of fullerene, including C60 and C70 ..." Prof. Kroto is accepted at his word in this instance, but the "word" is literally "fullerene, including C60 and C70". The Declaration did not directly state that the application showed possession of all fullerenes generically, only that the sixty-carbon molecules shown in the application were not flat or diamondoid but fullerenes.

Applicants argue that the specification in fact does have written support for "caged molecules" since C60 and C70 are described as such.

However, merely because two molecules are described as having a common characteristic does not necessarily imply that applicants were in possession of all substances having that characteristic. Note that C<sub>60</sub> has a molecular weight of 720, and is stated as such in the specification, but without more this would not appear to entitle applicants to claim that they were in possession of all molecules having that molecular weight.

Applicants refer to the decision in *In re Smythe* to state that applicants are entitled to later claim "inert fluid" when the original specification only had "air or other gas which is inert to the liquid", for the reason that the "description in the application suggested to the skilled artisan the broader term", in applicants' view. By analogy, the "present application supports the broader concept, fullerenes".

However, the language of the *Smythe* decision again states just why broad language might occur to a skilled artisan when reading a specification: it is because disclosure of for example, a "lead weight" would suggest "even such an undisclosed, but obviously art-recognized equivalent, 'weight' as a pound of feathers". It is also because a specification does not have to enumerate "the very many structural or functional equivalents of disclosed elements ... which are already stored in the minds of those skilled in the arts ..." (178 USPQ at 285). Thus, in order to replace narrow original language with broader language, the situation has to be one of "obviously art-recognized

equivalents". The question is asked rhetorically, what are the "obviously art recognized equivalents" of C60, C70 and C240, taking only into account the state of the art at the time of the instant application. It is certain that whatever those equivalents may be, they cannot include those fullerenes which were only discovered by surprise in 1991 or thereafter. Yet the claims claim them all.

Applicants point to the Kroto Declaration at its paragraphs 14-15 to assert that the "application describes the method for making macroscopic amounts of fullerenes and that the inventors had in their possession at the time of filing of the application macroscopic amounts of fullerenes". The Kroto Declaration has already been fully considered and is again considered with the instant application, and is seen to lack any statement that the macroscopic amounts refer to any other fullerenes other than C60 and C70. In fact, any inference which can be drawn from the Kroto Declaration that the macroscopic amounts refer to any other fullerenes other than C60 and C70, is explicitly rebutted by the instant specification which states at page 8, lines 1-5, that "the only other large mass found in any abundance corresponds to C70". Contrary to Applicants' arguments, the examiner has never dismissed or summarily dismissed the Kroto Declaration (although in the prior action the examiner used the word "opinion" in association with the declaration). According to the decision in *In re Alton*, 37 USPQ2nd 1578, a declaration such as Kroto's is to

be given weight along with other evidence on the record ~~on~~ on the issue of compliance with 35 USC 112. That is just what the examiner has done in accepting those statements in the declaration which are not contradicted by applicants' own specification.

Applicants' arguments made at length on pages 25-34 of their response, regarding the section 103 rejection over the Huffman article taken with the Iijima article, appear to be moot in view of the new grounds of rejection and in view of the Declaration under 37 CFR 1.131 used to antedate the publication date of the Soviet '000 reference.

With regards to the rejection over the Yoshimura reference in view of the Reck reference, applicants argue that the combustion gas used in Yoshimura to foster formation of carbon black is not a "quenching gas" since it contains oxygen and does not cool vaporized carbon.

However, the claims do not exclude the presence of oxygen; the quenching gas appears to only have to be "inert" in the sense that it does not react with the sooty carbon product which is first formed. If Yoshimura's combustion gas causes the carbon black to form, it must be inert to it. Also, there is no requirement for the inert gas of the claims to cool vaporized carbon.

Applicants argue that the products formed in the Yoshimura reference are different from the "graphitic carbon" formed in the

instant process. However, the formation of "graphitic carbon" would only appear to be a concomitant of the use of carbon sources which are elemental carbon; where the "carbon source" embraces, e.g., CO or oxygenated hydrocarbon, it does not appear that "graphitic carbon" would necessarily form.

Applicants argue that the Reck reference is only concerned with using an oxygen containing gas to remove extractibles from carbon black. On the contrary the reference teaches that one can purify furnace carbon black to remove extractable components including polycyclic aromatic hydrocarbons, by Soxhlet extract of the carbon black with solvents such as boiling toluene. See col. 1, lines 23-69. This extraction would qualify as the "extracting" step of the instant claims.

Applicants argue that the Bacon reference offers no evidence for formation of C60, and the Kroto Declaration amplifies this view.

However, the Bacon reference is not applied against claims requiring C60, but only against those claims which embraces "fullerenes" or "caged molecules" generically. "Caged molecules consisting solely of carbon atoms", and "fullerenes" as written, are terms which are sufficiently broad to embrace the "large graphite sheets rolled up into a tight tube" explicitly formed by Bacon (col. 3, lines 15-20).

Any inquiry concerning this communication should be directed to Peter DiMauro at telephone number (703) 308-0680.

PQ

Serial Number: 08/236,933  
Art Unit: 1103

-22-

DiMauro/mm  
August 6, 1996

*Michael J. Lewis*  
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